AMENDMENTS TO THE CLAIMS

Claims 1-22 (canceled)

Claim 23 (new): A method for monitoring a biological process, said method comprising:

receiving image data of an object having one or more features, said image data corresponding to frames comprising a plurality of pixels;

dividing each frame into one or more regions based on the one or more features and each region into one or more subregions;

filtering pixels in each subregion according to a pixel intensity range to provide a filtered output of pixels;

defining for each frame a first area within each subregion, said first area defined by one or more predetermined shape equations according to a shape of a feature to be monitored in the subregion; and

evaluating for each frame the number of filtered output of pixels in the first area for each subregion to transform the image data to a scalar feature signal for each subregion.

Claim 24 (new): The method of claim 23 further comprising:

defining for each frame a second area within each subregion, said second area adjacent to said first area; and wherein

said step of evaluating comprises determining for each frame the difference between the number of filtered output pixels in the first area and the number of filtered output pixels in the second area and outputting a value of the difference to produce the scalar feature signal for each subregion.

Claim 25 (new): The method of claim 23 further comprising:

detecting one or more changes in a feature in a first area of a subregion; and

modifying parameters of said shape equations defining said first area to correspond to the detected changes.

Claim 26 (new): The method of claim 24 further comprising:

transforming each scalar feature signal to produce a behavior indicating output signal for each subregion, said step of transforming comprising setting the value of the behavior indicating output signal to the value of the scalar feature signal at a first time if the value of the scalar feature signal at the first time is equal to or greater than the value of the behavior indicating output signal at a time preceding the first time and reducing the value of the behavior indicating output signal by a fraction if the value of the scalar feature signal at the first time is less than the value of the behavior indicating output signal at a time preceding the first time.

Claim 27 (new): The method of claim 26 wherein said fraction being a function of time elapsed from the first time and wherein parameters of said function being determined by the biological process.

Claim 28 (new): The method of claim 26 further comprising:

combining the behavior indicating output signals for each subregion to obtain a composite behavior indicating output signal to monitor the biological process.

Claim 29 (new): The method of claim 28 wherein said step of combining comprises linearly combining the behavior indicating output signals.

Claim 30 (new): The method of claim 28 further comprising:

correlating the composite behavior output signal with one or more independent measures of the biological process so as to increase the accuracy with which the composite behavior output signal monitors the biological process.

Claim 31 (new): The method of claim 28 further comprising:

modifying the composite behavior indicating output signal pursuant to an algorithm under program control to produce a composite measure of the biological process; and

determining whether the composite measure is below a threshold.

Claim 32 (new): The method of claim 31 further comprising:
sounding an alarm when the composite measure is below the threshold.

Claim 33 (new): The method of claim 31 further comprising:
generating electrical control signals pursuant to an algorithm when the composite measure is below the threshold.

Claim 34 (new): The method of claim 23 further comprising
acquiring image data via computerized microscopy; and
wherein the biological process is microscopic at the tissue, cellular or subcellular level.

Claim 35 (new): The method of claim 23 wherein the biological process is macroscopic.

Claim 36 (new): The method of claim 35 wherein the macroscopic biological process is drowsiness.

Claim 37 (new): The method of claim 36 wherein the step of receiving image data includes receiving data of facial images of an operator.

Claim 38 (new): The method of claim 37 wherein the one or more regions comprises an eye region, a mouth region and a facial boundary region.

Claim 39 (new): The method of claim 23 further comprising:
acquiring said image data by a video unit.

Claim 40 (new): The method of claim 23 wherein said step of filtering comprises:

determining whether a video intensity level of each pixel is within the pixel intensity range; and

setting the video intensity level to a predetermined value if the video intensity level is within the range and to another predetermined value if the video intensity level is outside the range to provide the filtered output.

Claim 41 (new): An apparatus for monitoring a biological process, said apparatus comprising a processor programmed to perform a method, said method comprising:

receiving image data of an object having one or more features, said image data corresponding to frames comprising a plurality of pixels;

dividing each frame into one or more regions based on the one or more features and each region into one or more subregions;

filtering pixels in each subregion according to a pixel intensity range to provide a filtered output of pixels;

defining for each frame a first area within each subregion, said first area defined by one or more predetermined shape equations according to a shape of a feature to be monitored in the subregion; and

evaluating for each frame the number of filtered output of pixels in the first area for each subregion to transform the image data to a scalar feature signal for each subregion.

Claim 42 (new): The apparatus of claim 41 wherein the processor is programmed to perform the method further comprising:

defining for each frame a second area within each subregion, said second area adjacent to said first area; and wherein

said step of evaluating comprises determining for each frame the difference between the number of filtered output pixels in the first area and the number of filtered output pixels in the second area and outputting a value of the difference to produce the scalar feature signal for each subregion.

Claim 43 (new): The apparatus of claim 41 wherein the processor is programmed to perform the method further comprising:

detecting one or more changes in a feature in a first area in a subregion; and

modifying parameters of said shape equations defining said first area to correspond to the detected changes.

Claim 44 (new): The apparatus of claim 42 wherein the processor is programmed to perform the method further comprising:

transforming each scalar feature signal to produce a behavior indicating output signal for each subregion, said step of transforming comprising setting the value of the behavior indicating output signal to the value of the scalar feature signal at a first time if the value of the scalar feature signal at the first time is equal to or greater than the value of the behavior indicating output signal at a time preceding the first time and reducing the value of the behavior indicating output signal by a fraction if the value of the scalar feature signal at the first time is less than the value of the behavior indicating output signal at a time preceding the first time.

Claim 45 (new): The apparatus of claim 44 wherein said fraction being a function of time elapsed from the first time and wherein parameters of said function being determined by the biological process.

Claim 46 (new): The apparatus of claim 44 wherein the processor is programmed to perform the method further comprising:

combining the behavior indicating output signals for each subregion to obtain a composite behavior indicating output signal to monitor the biological process.

Claim 47 (new): The apparatus of claim 46 wherein the processor is programmed to perform the method wherein said step of combining comprises linearly combining the behavior indicating output signals.

Claim 48 (new): The apparatus of claim 46 wherein the processor is programmed to perform the method further comprising:

correlating the composite behavior output signal with one or more independent measures of the biological process so as to increase the accuracy with which the composite behavior output signal monitors the biological process.

Claim 49 (new): The apparatus of claim 46 wherein the processor is programmed to perform the method further comprising:

modifying the composite behavior indicating output signal pursuant to an algorithm under program control to produce a composite measure of the biological process; and

determining whether the composite measure is below a threshold.

Claim 50 (new): The apparatus of claim 49 wherein the processor is programmed to perform the method further comprising:

sounding an alarm when the composite measure is below the threshold.

Claim 51 (new): The apparatus of claim 49 wherein the processor is programmed to perform the method further comprising:

generating electrical control signals pursuant to an algorithm when the composite measure is below the threshold.

Claim 52 (new): The apparatus of claim 41 wherein the processor is programmed to perform the method further comprising:

acquiring image data via computerized microscopy; and

wherein the biological process is microscopic at the tissue, cellular or subcellular level.

Claim 53 (new): The apparatus of claim 41 wherein the biological process is macroscopic.

Claim 54 (new): The apparatus of claim 53 wherein the macroscopic biological process is drowsiness.

Claim 55 (new): The apparatus of claim 53 wherein the processor is programmed to perform the method wherein the step of receiving image data includes receiving data of facial images of an operator.

Claim 56 (new): The apparatus of claim 55 wherein the one or more regions comprises an eye region, a mouth region and a facial boundary region.

Claim 57 (new): The apparatus of claim 41 a video unit for acquiring said image data.

Claim 58 (new): The apparatus of claim 41 wherein the processor is programmed to perform the method wherein said step of filtering comprises:

determining whether a video intensity level of each pixel is within the pixel intensity range; and

setting the video intensity level to a predetermined value if the video intensity level is within the range and to another predetermined value if the video intensity level is outside the range to provide the filtered output.